

**AIR FORCE BASE CONVERSION AGENCY - KELLY**  
**SITE E-1 SOIL AND GROUNDWATER**  
**FINAL PROPOSED PLAN**



**February 2002**

**Table of Contents**

Community Involvement	1
Background	2
History of Remedial Activities and Investigations	2
Chemicals of Concern and Cleanup Goals	3
Current Conceptual Model of Site E-1	
Soil and Groundwater	3
Summary of Interim Remedial Action Alternatives	7
Evaluation of Alternatives	8
Preferred Alternative	8
Glossary	10
References	11

The purpose of this Proposed Plan is to describe the preferred alternative for cleaning up soil and groundwater contamination in Site E-1 at the former Kelly Air Force Base.

The information includes a brief history of the site and an outline of remedial alternatives for Site E-1 soil and groundwater.

## INTRODUCTION

This Proposed Plan (PP) identifies the preferred alternative for an interim remedial action for impacted soil and groundwater present within the boundaries of Site E-1. This site is within Zone 2 at the former Kelly Air Force Base (AFB) in San Antonio, Texas (Figure 1). In addition, this PP includes summaries of other alternatives analyzed for cleaning up Site E-1 soil and groundwater. The Zone 2 and Zone 3 **Corrective Measures Study (CMS)\*** Report will address the evaluation and selection of final remedial alternatives for all impacted soil and groundwater related to Site E-1. The Air Force Base Conversion Agency (AFBCA),

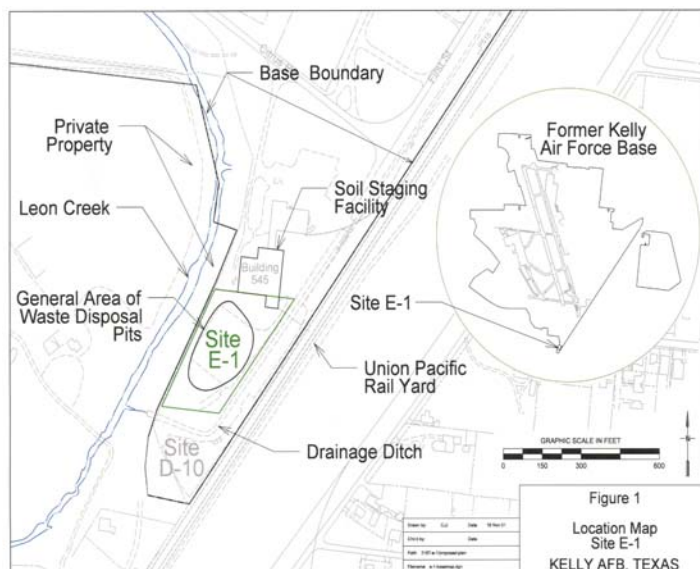


Figure 1 – Location Map  
Site E-1

## COMMUNITY INVOLVEMENT

### **PUBLIC COMMENT PERIOD: February 5, 2002 through March 7, 2002**

During the public comment period, you are encouraged to comment on the PP for Site E-1 Soil and Groundwater and the FFS Report. AFBCA, in consultation with TNRCC, may modify the preferred alternative or select another interim remedial action presented in this PP and the FFS Report based on new information or public comments. Therefore, the public is encouraged to review and comment on all the alternatives identified herein. Comments may be submitted either verbally or in writing during the public meeting. Comments may also be submitted through any one of the following:

Mail: Community Involvement Office  
Attention Site E-1  
Air Force Base Conversion Agency  
143 Billy Mitchell Blvd., Suite 1  
San Antonio, TX 78226-1816

Fax: (210) 925-3636  
e-mail: [vmusgrav@afbda1.hq.af.mil](mailto:vmusgrav@afbda1.hq.af.mil)  
website: <http://kelly.ch2m.com/empub/home.htm>

All comments should be sent to "Attention: Site E-1" and should be postmarked or received no later than March 7, 2002.

### **PUBLIC MEETING**

**Date: February 19, 2002**

**Time: 5:30 pm to 6:30 pm**

**Place: Kennedy High School**

You are invited to attend a poster session (prior to a Restoration Advisory Board [RAB] meeting) regarding the interim remedial action proposed for Site E-1 soil and groundwater at the former Kelly AFB. AFBCA representatives will describe the remedial alternatives that were evaluated and discuss the preferred interim remedial action during the poster session prior to the RAB meeting. The public will also have the opportunity to ask questions and comment on the alternatives.

\*Bolded words are defined in the glossary on page 10.

in consultation with the **Texas Natural Resources Conservation Commission (TNRCC)**, will select an interim remedial action for Site E-1 soil and groundwater only after the public comment period has ended and the information submitted during that time has been reviewed and considered. Therefore, the public is encouraged to review and comment on all the alternatives identified for soil and groundwater in the Site E-1 **Focused Feasibility Study (FFS)** (U.S. Air Force [USAF] 2001).

The U.S. Air Force (Air Force) has completed an Installation Restoration Program Strategy Plan (USAF 1988), a **Remedial Investigation (RI)** Report (USAF 1992), an **FFS** for Groundwater Remediation (USAF 1991), a Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) (USAF 2000), and an **FFS** for soil and groundwater for Site E-1 (USAF 2001).

This PP summarizes the interim action selection process, past action taken, the reason for selecting the preferred alternative, and a description of the preferred alternative. The PP is not intended to replace the **FFS**, and the public is encouraged to review the **FFS** and other site-related documents in the Administrative Record at the information repositories listed on page 13 of this document.

The Air Force is seeking public comment on the preferred alternative as well as other interim remedial action alternatives as part of its public participation responsibilities under its existing Public Involvement Plan (USAF 1998), in accordance with the **Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)** guidance. To help the public in its review, an overview of the interim remedial action alternatives and the reasons for selecting the preferred alternative are presented in this PP.

The Air Force's preferred interim remedial action alternative for soil and groundwater contamination associated with Site E-1 is Alternative 4 that consists of (1) **excavation** of surface soils, (2) removal of **organic** contaminants by thermally-enhanced **soil vapor extraction**, and (3) groundwater **containment** by a **slurry wall**.

## BACKGROUND

Kelly AFB was founded in 1917 as the first military air base in Texas. Since 1954, the primary mission of Kelly AFB was to provide logistics and aircraft maintenance for the Air Force. In July 1995, the Defense Base Realignment and Closure Commission recommended that Kelly AFB be closed. Congress accepted this recommendation and Kelly AFB closed in July 2001. AFBCA now manages the restoration activities at the former Kelly AFB.

The Air Force **Installation Restoration Program (IRP)**, which was created in 1976 by the Department of Defense (DoD), was structured in response to **CERCLA**. It is the way the DoD identifies and evaluates suspected contamination problems resulting from past hazardous waste disposal practices at DoD facilities. Kelly AFB responded to impacted soil and groundwater issues in accordance with the IRP. Corrective actions (including interim remedial actions) and groundwater **monitoring** are now conducted by the AFBCA in accordance with the Compliance Plan issued by the TNRCC in 1998.

Environmental investigations at the former Kelly AFB began in 1982. The base was divided into five zones (Zones 1 through 5) where remedial investigation would be focused.

Site E-1 is located at the southernmost corner of the former Kelly AFB in Zone 2. Leon Creek is located approximately 100 to 150 feet west of the former base boundary that is adjacent to Site E-1. Contamination associated with Site E-1 extends beyond the base boundary in the direction of Leon Creek and in the direction of the Union Pacific Railroad rail yard.

Site E-1 is a former chemical evaporation pit area that was used for disposal of chromium sludge, waste fuels and oils, solvents, acid sludge, and other wastes (see Figure 1). Several pits, located in the general pit area shown in Figure 1, were constructed in 1944 when construction of Building 545 (a former metal-plating facility) was completed. The overall dimension of the pit area was 180 feet by 320 feet. Disposal operations in the pit area ended sometime between the mid 1950s and the late 1960s and the area was filled with gravel and other fill materials.

## HISTORY OF REMEDIAL ACTIVITIES AND INVESTIGATIONS

A variety of remedial activities and studies have been performed at Site E-1 (Table 1). They include, but are not limited to the following:

- Preliminary Site Assessment
- Remedial Investigation
- Feasibility Study
- Interim Action
- RCRA Facility Investigation
- **Focused Feasibility Study**

Preliminary activities conducted in the mid-1980s documented **organic** (e.g., trichloroethene) and **inorganic** (e.g., chromium) contamination in soil and groundwater. Waste sludge was detected in two locations in the pit area. The 1992 RI confirmed the presence of **organic** and **inorganic** contaminants in the soil and groundwater, and assessed the potential **risks** associated with Site E-1. The

Preliminary Assessment 1984-1987	Remedial Investigation 1989-1992	Groundwater Focused Feasibility Study 1991	Groundwater Interim Action 1993-ongoing	RCRA Facility Investigation 1999-2001	Focused Feasibility Study 2001	Public Comment Period 2002	Interim Action Implementation 2002	Corrective Measures Study 2002	Corrective Measures Implementation Work Plan 2002-2003	Corrective Measures Implementation 2004	Monitoring (Operating Properly and Successfully)
ACTIVITIES COMPLETED						FUTURE ACTIVITIES					

**Table 1 – Timeline of the Zone 2 Site E-1 Restoration Process at the Former Kelly AFB**

RI concluded that health **risks** from direct exposure to contaminated soils was minimal. However potential exposure to contaminated groundwater might result in some **noncarcinogenic** and **carcinogenic** health risks.

Based on the Groundwater **FFS**, a **groundwater collection trench** was installed at Site E-1 in 1993 to prevent contaminated groundwater migration from the site. Review of the historical groundwater data collected since the installation suggests that the trench only partially prevents movement of the groundwater plume (USAF 2000).

As a result of the performance of the collection trench, along with findings from other remediation demonstration projects at Site E-1, it was determined that an RFI/**CMS** was needed to fully characterize the nature of the soil and groundwater contamination at Site E-1 prior to final remedy selection (USAF 2000). The RFI confirmed the continued presence in soil and groundwater of **organic** and **inorganic** compounds at levels that exceed **TNRCC Risk Reduction Standard (RRS)** No. 2 levels. It also confirmed the limited performance of the existing **collection trench**, the presence of groundwater contaminants upgradient of the source, and elevated contaminant concentrations in the high part per million range (see Table 2) within the source area (USAF 2000).

Area	COC	Maximum Concentration (ppb)	Depth of Contamination (feet bgs)	RRS No. 2 Value (ppb)
A	Trichloroethene	888,000	0-38	500
	Tetrachloroethene	4,450	8-22	500
	Cis-1,2-Dichloroethene	72,000	0-20	7,000
	Methylene chloride	3,700	8-20	500
	Vinyl chloride	1,100	0-34	10
	1,2-Dichlorobenzene	63,800	8-30	60,000
	1,3-Dichlorobenzene	7,100	8-20	330
	1,4-Dichlorobenzene	17,000	8-20	7,500
	Chlorobenzene	39,000	17-22	10,000
B	Bis (2-ethylhexyl)phthalate	85,000	0-10	600
C	Chromium	670,000	2-16	24,100

Note: Areas A, B, and C depicted in Figure 2.  
bgs below ground surface    ppb parts per billion    RRS Risk Reduction Standard

**Table 2-Summary of Soil Impacted Areas and Related Contaminants and Cleanup Goals**

## CHEMICALS OF CONCERN AND CLEANUP GOALS

AFBCA proposes to remediate Site E-1 to **TNRCC RRS** No. 2 (see glossary definition of RRS). The Site E-1 RFI (USAF 2000) provides a detailed description of the development of **RRS** No. 2 values and a complete list of chemical-specific **RRS** No. 2 values. Table 2 provides a list of the soil contaminants that exceed **RRS** No. 2 in each of the areas shown in Figure 2, including how deep they were detected and the soil **cleanup goal** for each contaminant.

Table 3 lists the site-specific groundwater **chemicals of concern (COC)** detected at concentrations that exceed **RRS** No. 2 values and includes the groundwater **cleanup goals**. Figures 3 and 4 present the extent of groundwater contamination using representative contaminants 1,2-dichloroethene (for **organics**) and chromium (for **inorganics**).

Site Specific COC	Monitoring Well Location	Maximum Detected Concentration	RRS No. 2 Value
<b>Organic COCs (ppb)</b>			
Total 1,2-Dichloroethene	WP021MW120	360,000	70
Trichloroethene	WP021MW120	71,000	5
Vinyl Chloride	WP021MW122	159,000	2
Chlorobenzene	WP021MW007	11,800	100
Tetrachloroethene	WP021MW006	230	5
1,1,2-Trichloroethene	WP021MW121	5,780	7
Toluene	WP021MW120	9,010	100
Benzene	WP021MW124	51	5
1,1,2-Trichloroethane	WP021MW121	540	5
1,2-Dichloroethane	WP021MW176	21	5
Methylene Chloride	WP021MW121	1,960	5
Carbon Tetrachloride	WP021MW122	10.8	5
1,4-Dichlorobenzene	WP021MW122	460	75
1,2-Dichlorobenzene	WP021MW007	3,350	600
1,3-Dichlorobenzene	WP021MW176	54	10
Bis (2-ethylhexyl) phthalate	WP021MW120	19	10
<b>Inorganic COCs (ppm)</b>			
Chromium	WP021MW173	1.2	0.1
Arsenic	WP021MW177	0.059	0.050
Thallium	WP021MW173	0.011	0.002
Antimony	WP021MW173	0.021	0.006
COC	chemical of concern	ppb	parts per billion
RRS	Risk Reduction Standard	ppm	parts per million

**Table 3 – Summary of Site-Specific Groundwater Chemicals of Concern and Cleanup Goals**

## CURRENT CONCEPTUAL MODEL OF SITE E-1 SOIL AND GROUNDWATER

The contaminant source is the chemical evaporation pit area where chromium sludge, waste fuels and oils, solvents, acid sludge, and other wastes were disposed. Soil contamination resulting from this activity is present in three areas (Figure 2). Areas A and B coincide with the location of the former evaporation pit area at the site. Area C is an area of chromium contamination that resulted from wastewater discharges from plating operations conducted in Building 545. Groundwater at Site E-1 flows in a northwest direction, towards Leon Creek. The maximum extent of groundwater contamination is represented in Figure 3 by the organic contaminant 1,2-dichloroethene. Groundwater contamination covers the Site E-1 source area, and extends northwest beyond Leon Creek. Small amounts of groundwater contamination also extend to the east and southeast.

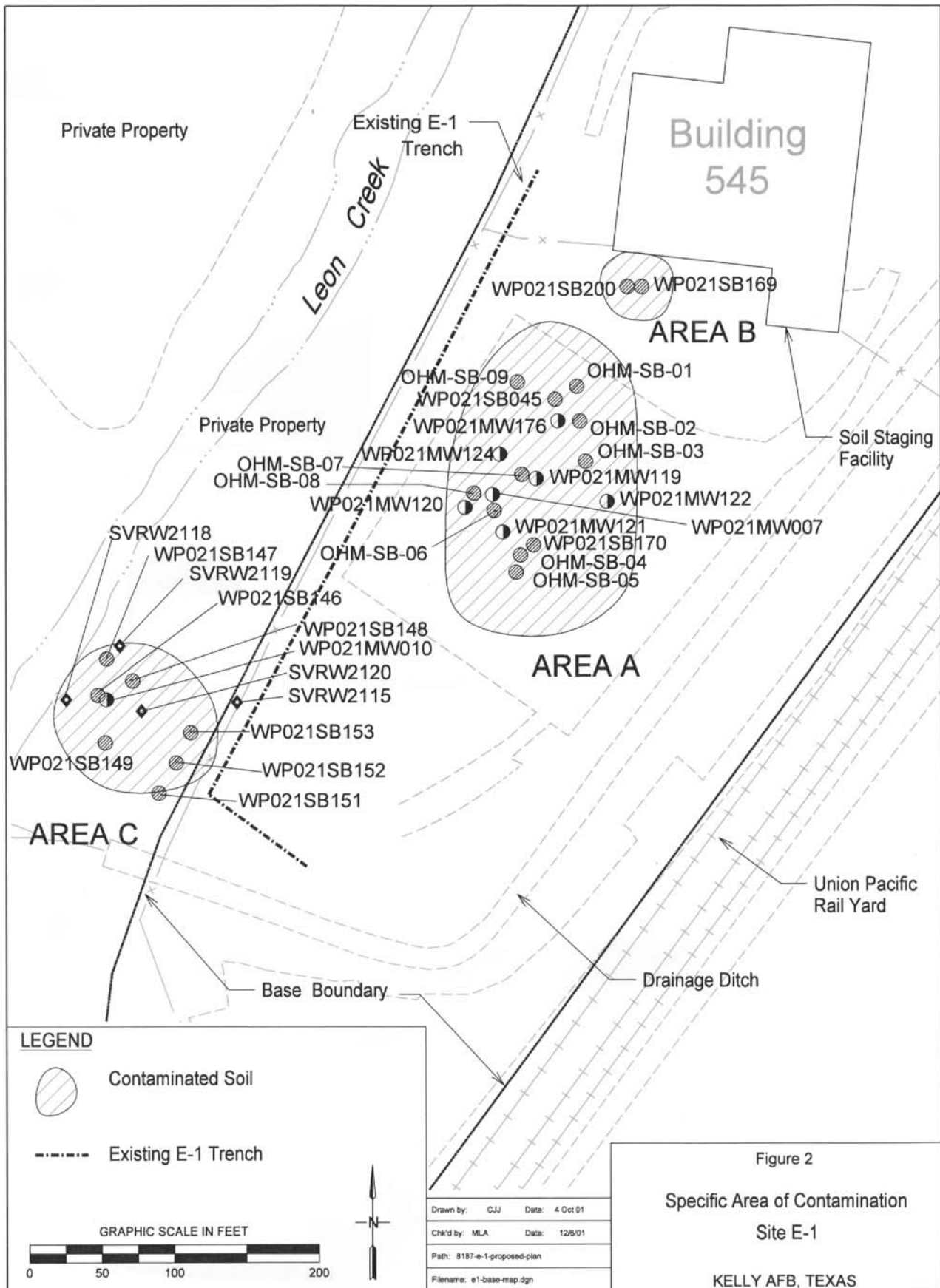


Figure 2 – Specific Area of Soil Contamination  
Site E-1

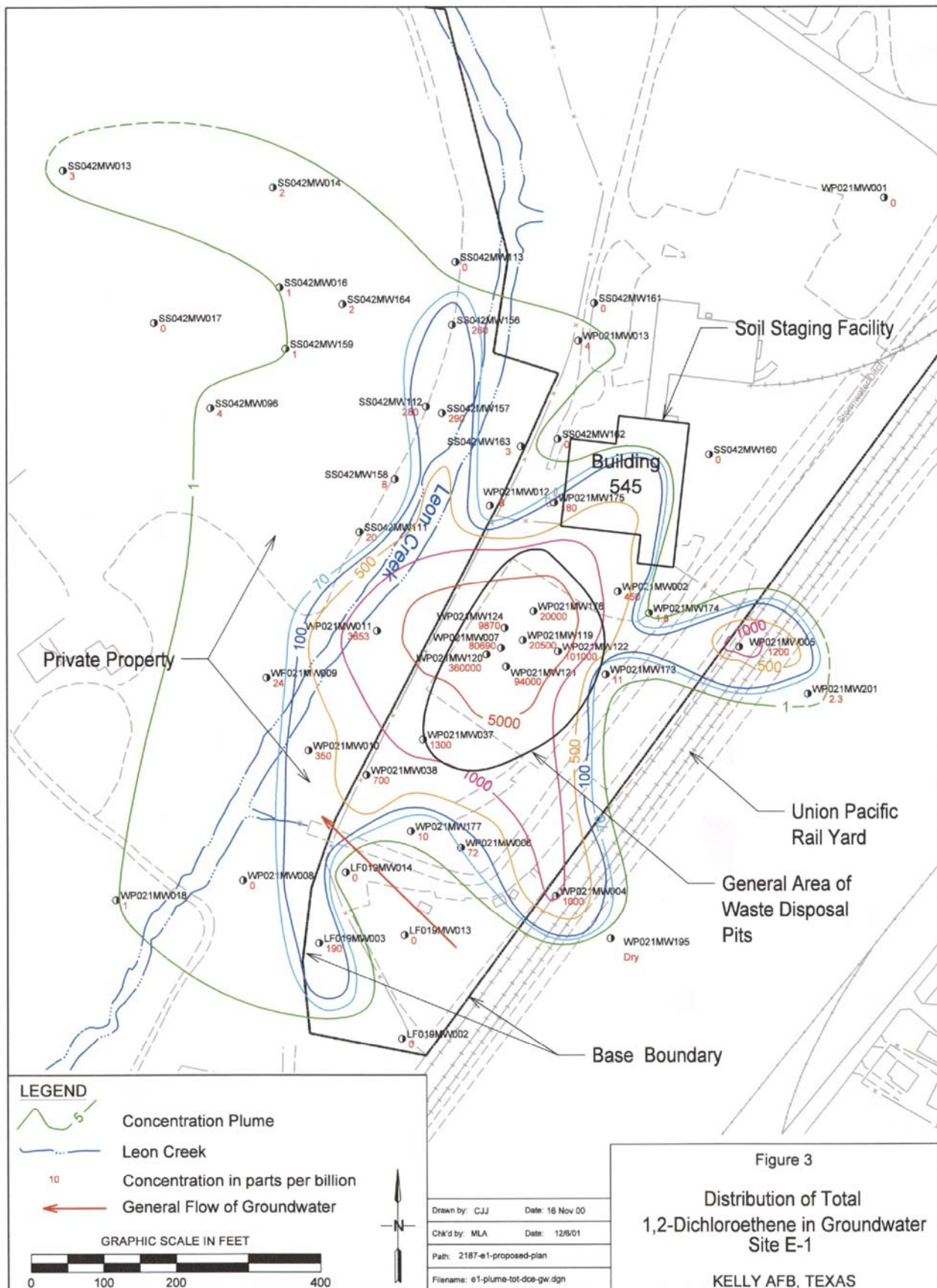


Figure 3 – Distribution of Total 1,2-Dichloroethene in Groundwater Site E-1



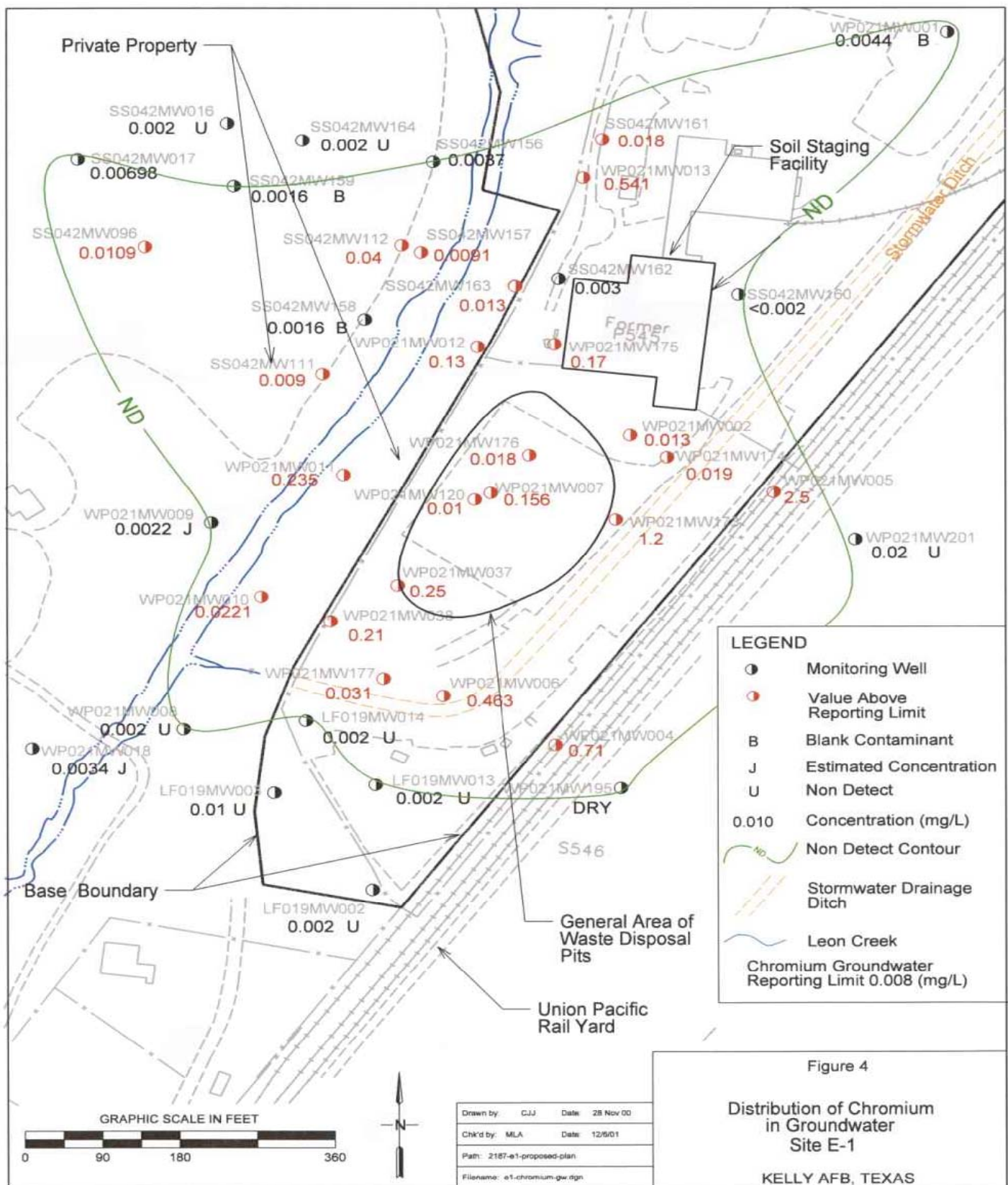


Figure 4 – Distribution of Chromium in Groundwater Site E-1

## SUMMARY OF INTERIM REMEDIAL ACTION ALTERNATIVES

The general remedial strategy for Site E-1 involves removal, **containment**, **stabilization**, or **treatment** of soil and groundwater **COCs** pursuant to a **RRS** No. 2 closure. Remediation technologies for addressing contaminated soil and groundwater are discussed in detail in the **FFS**. The following technologies were considered for remediation of **organic** and **inorganic** contaminants to achieve a **RRS** No. 2 closure for the site:

### Soil Remedial Technologies

- **Excavation**
- Enhanced **Soil Vapor Extraction (SVE)**
- **Vitrification**

### Groundwater Remedial and Containment Technologies

- **Collection Trench**
- **Slurry Wall**
- **Permeable Reactive Barrier (PRB)**

In general, all remedial alternatives include the following components:

- **Excavation** of contaminated soil. One alternative includes in situ soil **vitrification**.
- Some form of groundwater contaminant control in the E-1 source area. One alternative includes installation of a **PRB**.
- **Institutional controls** of industrial land use and restriction on the use of the shallow groundwater.
- Groundwater **monitoring** for evaluating the effectiveness of the remedial measures.

All alternatives were evaluated under an **RRS** No. 2 closure scenario. Table 4 summarizes the remedial alternatives for Site E-1.

Alternative	Media	
	Soil	Groundwater
1	Excavation of surface soil	Slurry wall with groundwater pumping for gradient control
2	Excavation of vadose and saturated soil into Midway formation	Slurry wall with groundwater pumping for gradient control
3	Excavation of vadose and saturated soil into Midway formation	Collection trench (correct old trench, add new trench)
4	Excavation of surface soil Thermally-enhanced soil vapor extraction	Slurry wall with groundwater pumping for gradient control
5	Soil vitrification	Permeable reactive barrier

Table 4 – Summary of Remedial Alternatives

**Alternative 1: Minimal Excavation of Soil and Groundwater Containment by Slurry Wall.** Alternative 1 involves excavating soil in Areas A and B to a depth of two feet below ground surface (bgs) and excavating soil in Area C to an average depth of 12 ft bgs. **Excavation** in Area C will require **dewatering**. This water will be sent to

the existing groundwater **treatment** plant (GWTP) for treatment, and discharged into Leon Creek in accordance with the discharge permit. All excavated soils will be disposed of at appropriate off-site landfills.

After **excavation** activities are complete, a **slurry wall** will be built around the entire site for groundwater **containment**. The length of the wall will be approximately 1,300 feet. Three **groundwater recovery wells** placed inside the **slurry wall** will make sure groundwater contamination does not leave the **slurry wall** area.

**Alternative 2: Complete Excavation of Soil, and Groundwater Containment by Slurry Wall.** Alternative 2 involves excavating all soil in Areas A, B, and C. Soil in Areas A and B will be excavated to approximately 40 feet bgs. Area C will be excavated to an average depth of 12 feet bgs. **Excavations** at all areas will require **dewatering**. This water will be sent to the existing GWTP for treatment, and then discharged into Leon Creek. All excavated soils will be disposed of at appropriate off-site landfills.

The **slurry wall** and groundwater recovery portion of Alternative 2 will be implemented in the same manner as described in Alternative 1.

**Alternative 3: Complete Excavation of Soil, and Groundwater Containment by Collection Trench.** The complete **excavation** and off-site disposal of soil portion of Alternative 3 will be implemented in the same manner as described in Alternative 2.

After **excavation** activities are complete, a groundwater **collection trench** will be constructed around the entire site. Four new standpipes will be installed to collect groundwater from the new trench. This water will be sent to the existing GWTP for treatment, and then discharged into Leon Creek.

**Alternative 4: Minimal Excavation of Soil, Thermally-Enhanced SVE System, and Groundwater Containment by Slurry Wall.** The surface **excavation** portion of Alternative 4 will be implemented in the same manner as described in Alternative 1.

A thermally-enhanced (**six-phase soil heating**) **SVE** system will be used to remove **organic** contaminants from soil below two feet bgs in Areas A and B. This process uses electrodes inserted into the soil to heat the soil and contaminants to the boiling point of water, thus helping the recovery by **SVE**. The estimated installation and operation period for the thermally-enhanced **SVE** system is approximately nine months.

The **slurry wall** and groundwater recovery portion of Alternative 4 will be implemented in the same manner as described in Alternative 1.

**Alternative 5: Soil Vitrification and Permeable Reactive Barrier (PRB).** Alternative 5 includes the **vitrification** of all soil in Areas A, B, and C. In this process, electrodes are inserted into the soil to melt the soil and thus trap contaminants therein.

Contaminated groundwater will be contained and treated by a **PRB** constructed around the entire site. The length of the barrier will be approximately 1,300 feet. The **PRB** will be designed for **treatment** of the chlorinated solvents in groundwater.

## EVALUATION OF ALTERNATIVES

The Air Force used nine criteria recommended by federal **U.S. Environmental Protection Agency** (USEPA 1988) regulatory guidance to evaluate the alternatives developed in the **FFS** for Site E-1 soil and groundwater (Table 5). Each alternative must completely meet the threshold criteria. The five primary criteria are used to refine the preferred alternative selection. The last two modifying criteria, state agency comment and community comment, will be evaluated following the comment period on the **FFS** and this PP. A summary of the evaluation of each of the five alternatives against these criteria is presented in Table 6.

## PREFERRED ALTERNATIVE

Based on the evaluation of alternatives presented, Alternative 4 was retained for final consideration. Alternative 4 involves surface soil **excavation**, thermally-enhanced **SVE**, and a **slurry wall**. The other four alternatives considered under the **RRS** No. 2 evaluation were rejected for various reasons. Alternatives 1 and 5 leave the majority of the contaminants in place and thus do not satisfy the **RRS** No. 2 requirement for contaminant removal. Alternative 5 provides reduction in contaminant mobility through the **vitrification** process; however, the cost is prohibitive. Alternatives 2, 3, and 4 all meet the **RRS** No. 2 requirements. However, the capital cost for Alternative 4 is significantly less than that of Alternatives 2 and 3. This is attributable to the use of an in situ process for **organic** contaminant removal at Areas A and B.

### EVALUATION CRITERIA FOR REMEDIAL ALTERNATIVES

#### Threshold Criteria

**Overall Protectiveness of Human Health and the Environment** evaluates whether an alternative eliminates, reduces, or controls threat to public health and the environment through institutional controls, engineering controls, or treatment.

**Compliance with Applicable Relevant and Appropriate Requirements (ARARs)** evaluates whether the alternative meets Federal and State Environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.

#### Primary Criteria

**Long-term Effectiveness and Permanence** considers the ability of an alternative to maintain protection of human health and the environment over time.

**Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment** evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.

**Short-term Effectiveness** considers the length of time needed to implement an alternative and the risk the alternative poses to workers, residents, and the environment during implementation.

**Implementability** considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services,

**Cost** includes estimated capital and annual operations and maintenance costs. Cost estimates are expected to be accurate within a range of +50 to - 30 percent.

#### Modifying Criteria

**State Comment** considers the State input regarding the USAF analyses and recommendations, as described in the FFS and the Proposed Plan.

**Community Comment** considers the local community input regarding the USAF analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

Table 5 – Summary of Evaluation Criteria



<b>Alternative</b>	<b>Alternative 1: Surface Soil Excavation and Slurry Wall</b>	<b>Alternative 2: Vadose and Saturated Soil Excavation and Slurry Wall</b>	<b>Alternative 3: Vadose and Saturated Soil Excavation and Collection Trench</b>	<b>Alternative 4: Surface Soil Excavation, Thermally-enhanced SVE and Slurry Wall</b>	<b>Alternative 5: Soil Vitrification and Permeable Reactive Barrier</b>
<b>Criterion</b>					
1. Overall protection of human health and the environment.	All alternatives provide adequate protection of human health and environment.				
2. Compliance with ARARs.	SOIL: Cleanup goals not met because contaminated soils not removed from site. GROUNDWATER: Cleanup goals met through pumping of contaminated groundwater.	SOIL: Cleanup goals met through removal of contaminated vadose and saturated zone soil to RRS No. 2 levels. GROUNDWATER: Cleanup goals met through pumping of contaminated groundwater.	SOIL: Cleanup goals met through removal of contaminated vadose and saturated zone soil to RRS No. 2 levels. GROUNDWATER: Cleanup goals met through pumping of contaminated groundwater.	SOIL: Cleanup goals met through SVE removal of VOC and SVOC contaminants. GROUNDWATER: Cleanup goals met through pumping of contaminated groundwater.	SOIL: Cleanup goals not met because contaminated soil not removed from site. GROUNDWATER: Cleanup goals partially met through PRB treatment of VOCs. Treatment of inorganics not achieved by PRB technology.
3. Long-term effectiveness and permanence.	Long-term effectiveness dependent on construction quality and integrity of slurry wall.	High reliability and effectiveness.	High reliability and effectiveness.	High reliability (pilot test to be conducted in 2002).	High reliability and effectiveness.
4. Reduction in the toxicity, mobility, or volume of wastes.	Minimal reduction in waste volume by excavation. Slurry wall eliminates waste mobility.	Major reduction in waste volume by excavation. Slurry wall eliminates waste mobility.	Major reduction in waste volume by excavation. Collection trench eliminates groundwater waste volume by mass removal.	SVE reduces waste volume by organic mass removal. Slurry wall eliminates waste mobility.	Soil waste mobility eliminated by vitrification. Groundwater waste volume reduced by treatment in PRB system.
5. Short-term effectiveness.	Risks to community health limited to off-base trucking of soils for disposal, which can be properly managed to minimize impact.	Risks to community health limited to off-base trucking of soils for disposal, which can be properly managed to minimize impact.	Risks to community health limited to off-base trucking of soils for disposal, which can be properly managed to minimize impact.	Risks to community health limited to vapor emissions from SVE system, which can be mitigated by appropriate treatment processes.	Risks to community health limited to vapor emissions from vitrification system, which can be mitigated by appropriate treatment processes.
6. Implementability.	All alternatives represent high implementability (site constructability, availability of technologies, goods, and services).				
7. Total cost (including 30-year O&M period).	\$8.0 MM	\$16.0 MM	\$19.6 MM	\$10.5 MM	\$33.2 MM
Note: The state and community criteria will be evaluated for each alternative after the public comment period. ARAR    Applicable or Relevant and Appropriate Requirement MM       millions SVE      soil vapor extraction PRB      permeable reactive barrier O&M    operations and maintenance					

## GLOSSARY OF TERMS

**Carcinogen**-a substance known to cause cancer.

**Chemicals of Concern (COC)**-site-related chemicals identified as the specific contaminants to be addressed by the remedial actions at the site.

**Cleanup Goal**-contaminant concentration levels that are considered protective of human health and the environment (i.e., concentrations below these levels do not pose an unacceptable risk to human health or the environment).

**Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)**-commonly referred to as "Superfund," this federal law addresses abandoned and inactive hazardous waste sites that pose a risk to human health and the environment.

**Containment**-control of groundwater contaminant migration by means such as groundwater extraction, in situ treatment, or barrier technologies such as a slurry wall.

**Corrective Measures Study (CMS)-RCRA** corrective action process to identify and evaluate potential remedial alternatives for releases that have been identified at a facility.

**Dewatering**-temporary removal of groundwater so that soil excavation can be carried out in the saturated zone.

**Excavation**-removal of contaminated soil from source areas by using a backhoe or similar equipment. The excavated soils are hauled off to another location for treatment or disposal.

**Focused Feasibility Study (FFS)**-a study undertaken by the lead agency to develop and evaluate options for an interim remedial cleanup action.

**Groundwater Extraction (Recovery Wells and Collection Trench)**-the use of groundwater recovery wells and/or subsurface trenches to extract groundwater for treatment at another location and disposal.

**Inorganics**-chemical constituents such as metals that do not have carbon in them.

**Installation Restoration Program (IRP)**-the Department of Defense (DoD) program designed to identify, report and correct environmental deficiencies at DoD installations.

**Institutional Controls**-administrative and/or legal means, such as deed recordation or municipal ordinances, to restrict exposure to contaminated soil or groundwater.

**Monitoring**-ongoing collection of field information about the environment that helps gauge the effectiveness of a cleanup action.

**Noncarcinogen**-a substance not proven to cause cancer.

**Organics**-chemical constituents, such as solvents and fuels, containing carbon.

**Permeable Reactive Barrier (PRB)**-these in-ground barriers allow the passage of clean water through them while prohibiting the movement of contaminants. This is done by employing compounds such as oxidizing agents, sorbents or microbes.

**Remedial Investigation (RI)**-a study undertaken by the lead agency to determine the nature and extent of the problem presented by a release of contaminants. The RI emphasizes data collection and site characterization.

**Resource Conservation and Recovery Act (RCRA)**-this federal law addresses the generation, transport, treatment, storage and disposal of hazardous waste.

## GLOSSARY OF TERMS (cont.)

**Risk**-the probability of an undesired effect.

**Risk Reduction Standards (RRS)**-the risk-based cleanup standards implemented by the TNRCC for hazardous waste site cleanup.

**Six-Phased Heating**-a soil heating technology involving the splitting of conventional three-phase electrical supply into six separate electrical phases for improved subsurface heat distribution. Each phase is delivered to one of six electrodes arranged in a hexagonal pattern at the treatment area. Contaminants in the soil are then vaporized and removed by SVE.

**Slurry Wall**-a narrow trench filled with a low-permeability material to control the migration of contaminated groundwater. The installation involves excavating a narrow trench, which is filled with fluid (i.e., slurry). Bentonite is the most common material used for slurry trenching.

**Soil Vapor Extraction (SVE)**-treatment technology that uses vacuum blowers and vapor extraction wells to strip volatile organics (VOCs) from unsaturated soil.

**Stabilization**-the addition of chemicals or material to the soil to prevent the migration of contaminants.

**Texas Natural Resources Conservation Commission (TNRCC)**-the state organization responsible for overseeing cleanup of hazardous waste sites.

**Treatment**-a method or process that changes the chemical or physical nature of a contaminant so as to neutralize its hazardous effects.

**U.S. Environmental Protection Agency (USEPA)**-the federal organization responsible for overseeing cleanup of hazardous waste sites.

**Vitrification**-use of electrical power to heat and melt soils contaminated with organic, inorganic, and metal-bearing wastes. The molten materials cool to form a hard, monolithic, chemically inert, stable product of glass and crystalline material that incorporates and immobilizes the inorganic compounds and metals.

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## Whom Do I Call if I Have a Question?

Kelly Public Information Line  
Tel: (210) 925-0956 (available in Spanish or English)  
Fax: (210) 925-3636

Or mail questions/comments to:  
Vanessa Musgrave  
Community Involvement Office  
Air Force Base Conversion Agency  
143 Billy Mitchell Blvd., Suite 1  
San Antonio, TX 78226-1816

## Where Can I Review the Site E-1 FFS Report?

You can review the Site E-1 FFS and other soil and groundwater documents  
at the information repository located at:

San Antonio Library  
Government Documents Section  
Second Floor  
600 Soledad  
San Antonio, TX 78204  
Tel: (210) 207-2500

Kelly Library  
Building 1650, Room 138  
250 Goodrich Drive, Suite 6  
San Antonio, TX 78241-5806  
Tel: (210) 925-4116

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## Mailing List Coupon

If you would like to receive further information about environmental activities at former Kelly AFB, please complete the form,  
clip, and mail to:

Vanessa Musgrave  
ATTN: Mailing List  
Community Involvement Office  
Air Force Base Conversion Agency  
143 Billy Mitchell Blvd., Suite 1  
San Antonio, TX 78226-1816  
Tel: (210) 925-0956 (available in Spanish or English)

Name \_\_\_\_\_ Affiliation \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip Code \_\_\_\_\_